Сучасне птахівництво

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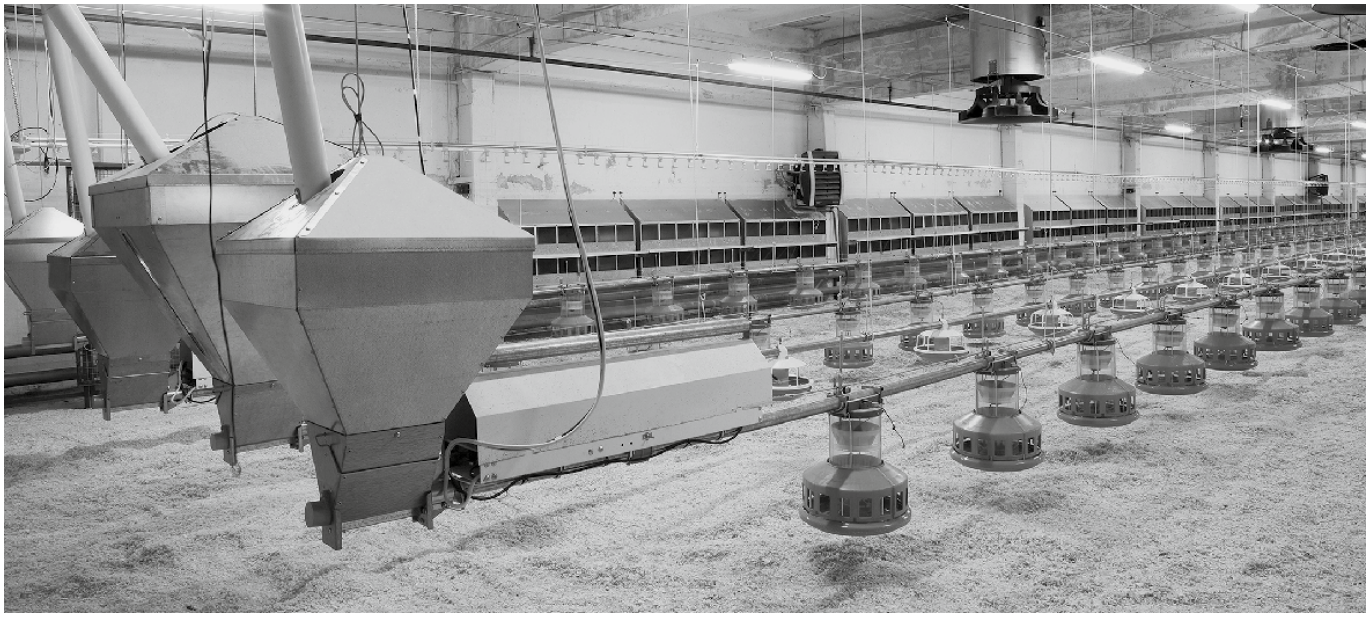

Predesign efficiency research of two broilers cultivation technologies

The main aspects of broilers meat production complexes designing are substantiated in this article. Complexes implementation predesigning research with total capacity of 45 thousand tons per year using two broilers cultivation technologies is conducted. The expenses forming the product total cost are summarized.

Broiler, cage, floor, maintenance, technology, design, costs, equipment

It is well-known that the Earth's population is increasing by approximately 80 million per year (by 1.3%) and, by the end of 2014, it reached 7.3 billion [7,9]. If the further foodstuffs production, especially, of the animal origin albumen, grows not so fast, then, to 1 billion people who are starving or having problems with good nutrition now, millions of new ones will be added annually [6]. Fortunately, the broiler industry development rates (2.4% per year) outpace the population growth; and this tendency, as it is supposed [9], will remain for 5 to 7 years more (up to 2022). However, a further increase in broiler meat production, according to this industry traditional development strategy, can only be provided under condition of creating new farms and complexes that is connected with reducing farmland considerably, including the ploughland necessary to produce fodder and foodgrain. Meanwhile, in some countries (the USA, the EU, etc.), the land reserves intended for building new livestock complexes are already almost exhausted [6]. Therefore, a further increase in production of broiler meat in these countries is only possible if applying new cage poultry operation technologies providing, in comparison with traditional flooring methods, 2 to 3 times increase in their deadweight per one area unit of available poultry houses.

Analysis of sources. The cage poultry operation method has been known since time immemorial, but in production quantities, it has found a use only after World War II. In the USSR, for example, up to 60% of broiler meat was made using broilers cage cultivation technologies, and only 40% by using the floor ones. And in today's Russia, their ratio has almost not changed [11]. The main advantage of cage technologies consists in a more intensive use of the available poultry houses (meat yield is 2 to 3 times higher). Herewith, there is no need to buy and utilize any bedding afterwards; a high veterinary and sanitary level of poultry operation is maximized. The chicken are less motile, they reach slaughter standards quicker at smaller costs of forage for gaining body weight [3.5]. Nevertheless, in the USA and EU countries, the broilers are generally grown up using floor technologies which public organizations on protection of animals consider more humane than the cage ones [11,12]. This wrong opinion was created because of

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reports on some cases of breast blisters and fractures of wings detected when unloading chickens out of cages to be slaughtered [5,8,10].

However, it was soon established that the breast blisters were only formed at very few chickens cultivated before achieving the age of 43 to 45 days. When cultivating those ones up to the age of 60 to 70 days, especially at the increased cage density, this phenomenon is reaching massive proportions [5]. Therefore, now, broilers are, as a rule, grown up before achieving the age of 36 to 42 days at the cage density within 18 to 29 m^2/bird (345 to 555 cm^2/bird), and cage batteries are equipped with a system of automatic poultry bodies unloading without injuries, fractures of wings and without hand-labour costs [4].

As a rule, when evaluating comparatively the known broiler cultivation technologies (floor, cage, alternative, etc.), one considers the parameters of some characteristics only, for example, the cultivation duration, body weight at slaughter, forage costs for 1 kg of gain, expenses of some other resources [3,5,8,11,12]. Such estimates are superficial, as they do not cover all types of expenses.

The work purpose is to investigate comprehensively the broiler meat production efficiency when using cage and floor technologies. This work first stage problem is to investigate the level of costs to create two workshops for broiler cultivation with a capacity of 45 thousand tons per year (in deadweight) each one.

Research material and technique. Modern complexes for producing broiler meat consist of several territorially remote production sites, in particular, of a hatchery, a workshop of parent flock, a chicken slaughter workshop and others. Among them, the basic one is the chicken meat cultivation workshop. We have investigated the costs (type and level) for creating a broiler cultivation workshop using cage technologies (pilot option), and one more workshop of a similar capacity (45 thousand tons) using floor technologies (control). Similar production units (45 thousand tons, floor poultry operation method) and ones much more powerful (up to 440 thousand tons) are already functioning in Ukraine. We defined a necessary number of standard poultry houses (18x96 m), the area of the land plots to place them according to the existing standards and rules [1,2], the extent of roads inside the farms, engineering networks, etc. In the compared options, the chicken cultivation was planned at the standard cage density before achieving the age of 42 days. When calculating, we did not use any methods of meat yield increase at production areas due to reconsolidations and subsequent deconsolidations of chickens practiced now by some poultry farms [8].

Research results and discussing them. The specification for a comparative analysis of two cross Kobb-500 chicken cultivation options is provided in table 1. So, into the cage batteries [4] of one poultry house (1752 cages for 1.93 m^2), one can place 71832 chickens for cultivation (470.7 cm2/birds, or 41 bird/cage). At the normative safety (96%) and body weight (2.7 kg), the deadweight of the chickens who are grown up to the age of 42 days (2.0 kg/bird) in one poultry house will make 137.9 tons (71832 x 0.96 = 68958 birds x 2.0 kg = 137917 kg); and at 6.3 turns per year, it will make 868.9 tons. The capacity of a poultry house similar on dimensions, when using chicken floor cultivation technology, makes 380.1 tons of meat per year. Thus, to produce 45000 tons of meat per year, one needs 52 poultry houses when using cage chicken cultivation technology, and 118 poultry houses when using the floor one. Despite a significantly smaller cost (by 9.6 times) of the equipment for a poultry house with floor broiler cultivation, their total cost (paragraph 9) was only by 927 thousand c.u. (US dollars) cheaper than in pilot (cage) option.

Taking into account only the types of expenses given in the table, it is visible that to create the broiler cultivation capacities using cage technologies, one needs to invest by 1.8 million c.u. less than in the control (floor technologies). Actu-

Type and level of costs to create a broiler cultivation workshop using cage and floor technologies

Indicators	Method of maintenance	
	cage	floor
Design capacity, one thousand tons of meat per year	45	45
Seats in a poultry house, birds	71832	31104
1 poultry house capacity, thousand tons per year	868.9	380.1
Number of standard poultry houses needed, pcs	52	118
Cost of 1 poultry house, c.u.	420150	420150
Total cost of all the poultry houses, thousand c.u.	21847.8	49577.7
Cost of the equipment for 1 poultry house, c.u.	721387	75042
Total cost of the equipment at all the poultry houses, thousand c.u.	37512.1	8855.0
Total cost of all the poultry houses with the installed equipment, thousand c.u.	59359.9	58432.7
Area of the production zone, hectare	40	90
Cost of the land plot, thousand c.u. (22000 x 40 = 880000; 22000 x 90 = 1980000)	880	1980
Total length of roads in the zone, rm	42000	62600
Costs to install a roadbed, c.u./rm	20.0	20.0
Total cost of internal roads, thousand c.u.	840	1252
Extent of internal water supply and sewer systems, km	4.4	10.1
Total costs to install water supply and sewer systems, thousand c.u.	1200	1900
Extent of internal power supply networks, km	2.5	5.3
Total costs to install internal power supply networks, thousand c.u.	980.0	1200.0
Extent of the zone territory barrier, km	3.0	8.8
Costs to install the zone barrier, thousand c.u.	40.2	118.0
Amount of covering material needed, thousand tons	—	34.7
Cost of covering material, thousand c.u.	—	173.4
Total expenses (pts 9+11+14+16+18+20+22)	63300.1	65056.1

ally, this difference is more essential, and we will define it further. In particular, when using the cage technology, 52 poultry houses are placed at one production area divided into 6 subzones with 6 poultry houses in each one, and 2 subzones with 8 poultry houses in each one. The workshop of a similar capacity, when using floor technologies, consists of 5 areas with 22 to 24 poultry houses in each one. In turn, each of these 5 zones is divided into 4 subzones with 5 to 6 poultry houses in each one. We have considered the costs to install roads and power supply networks only at production areas, but we have not considered them among 5 areas in the control option (floor technologies), the distance among which ones has to be not less than 3 km. In the same control option, we have not yet considered the costs to transport 34.7 thousand tons of fresh bedding and 109.3 thousand tons of used one; and also, the expenses connected with buying of a land plot and creating of a polygon to store and process this amount of used covering material have not been considered yet. It is necessary to pave to the polygon a road not less than 3 km long. When using cage technologies, the labour costs on bird care (in 52 poultry houses) will also be significantly lower than in the control (118 poultry houses). Taking into account the listed and some other expenses, the option to create a broiler cultivation production using cage technologies seems to be even more attractive.

Conclusion

We have done a predesign research of two options to create broiler cultivation productions (45 thousand tons per year) using cage and floor technologies according to the veterinary health regulations and technology design standards currently in force in Ukraine. It is shown that, to create a production based on using floor technologies, one needs to invest much more (more than 1.8 million c.u. more). ■

У статті обґрунтовано головні аспекти проектування комплексів для утримання курчат-бройлерів. Проведено передпроектні дослідження із впровадження комплексів загальною потужністю виробництва 45 тис. тонн м'яса на рік за двома технологіями вирощування курчат. Зведено основні статті витрат, що формують собівартість продукту.

Бройлер, клітка, підлога, утримання, технологія, проектувати, витрати, обладнання

В статье обоснованы главные аспекты проектирования комплексов для содержания цыплят-бройлеров. Проведены предпроектные исследования по внедрению комплексов общей мощностью производства 45 тыс. тонн мяса в год, с использованием двух технологий выращивания цыплят. Сведены основные статьи затрат, формирующих себестоимость продукта.

Бройлер, клетка, пол, содержание, технология, проектировать, затраты, оборудование

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